Vermont Farm Methane Project Quarterly Report

Prepared by: Jeffrey W. Forward and Dan Scruton **July 15, 2002**

Introduction:

The Vermont Department of Public Service (DPS) and the Vermont Department of Agriculture (AGR) have received a total of $695,000 from appropriations from the federal budget over the past several years to promote the use of methane recovery technology on Vermont dairy farms. This technology has the potential to help farmers with their nutrient management plans and at the same time provide additional on-farm income. The goal of this project is to identify and help overcome key strategic hurdles to widespread adoption of methane recovery technologies by Vermont farmers.

The project was designed to consider methane recovery in a broad context, taking into account its potential benefits as a component of a comprehensive nutrient management system, as a renewable energy source and as a strategy for greenhouse gas reduction. The implementation plan calls for using one third of the money for project administration and outreach, one third toward research and development and one third to be used for cost share of installations.

PROJECT SUMMARY-TO-DATE AND PROJECT ACTIVITIES April 1 - June 30, 2002

ORGANIZATIONAL:

Biomass Energy Resource Center, Inc.

The Vermont Methane Project established a part time staff position at the Biomass Energy Resource Center (BERC) that will be specifically devoted to this project. BERC is a not-for-profit private corporation with the mission of promoting and developing biomass energy projects. This is a project oriented organization that hopes to work on biomass projects in Vermont, the Northeast and globally. Vermont has considerable experience in small and medium scale biomass projects and the goal of this organization is to export that expertise by facilitating specific projects.

Project Advisory Committee:

We do not have a Project Advisory Committee scheduled at this time. We are in the process of re-evaluating our outreach strategy and will adjust it based on the new reality since the group net metering law passed. Once we have worked out a proposed strategy, we will convene a project advisory committee to solicit their input.

Project Executive Committee:

With the passage of the group net metering legislation, we want to re-evaluate the services we may be able

to provide Vermont farmers. The project held an executive committee meeting on June 17 to discuss the status of the project and to begin the discussion of where the project should allocate its resources over the coming months. Attached is an agenda from that meeting.

POLICY INITIATIVES:

S. 264 Renewable Energy Bill

The Vermont legislature debated the fate of S. 264 up until the very last days of the legislative session. Ultimately the bill did not pass. However, the section of the bill that dealt with group net metering for farm based systems was attached to another bill, S. 138 and that bill did pass. Attached is a copy of the bill as enacted into law. The relevant section is toward the end Section 5, § 219a. SELF-GENERATION AND NET METERING.

We believe this law will change significantly the incentive to install methane recovery systems on Vermont Dairy farms. The bill has the following features:

- Public Service Board oversees the approval of net metering applications and issues a certificate of public good
- Farms are allowed to aggregate farm related metered accounts and net meter total generation against total use. Meters can include:
    - Farm buildings
    - Residences owned or occupied by the owner
    - Employee housing
- 150 kilowatt is the maximum generator output
- Excess generation credited to a pool on a monthly basis. This monthly calculation that reverts to the utility if not used with in one year
- There is an option for utility to contract with farm to purchase any or all of the energy produced upon mutual agreement
- Utilities are allowed to charge fees for interconnection, establishment, special meter reading, accounting and certain distribution system changes
- Utilities are not allowed to charge demand charges, time of day usage or standby charges
- Any renewable energy credits
    - Will go to the utility if the system is designed smaller than the account needs.
    - Stay with the farmer if the system is larger than the metered needs.
- Utilities must make net metering available to any customer using a net metering system on a first come first served basis until the cumulative generating capacity of net metering systems equals 1.0 percent of the distribution company's peak demand. This 1% cap (1% of 1996 peak or last year whatever is less) keeps the number of customers allowed to do this to a low enough number so that no one utility will loose too much income or have any distribution problems from the number of systems. The 1% cap is soft so that the utility and farmer can ask for an extension however, the board must agree this extension is in the public interest.

Our next steps will be to re-evaluate our outreach strategy and reconsider what kind of technical support we should be providing Vermont dairy farmers. Our goal is to develop a viable market for the use of methane recovery technology on Vermont dairy farms that can stand on its own without the ongoing support of subsidies. The net metering law should go a long ways toward solving many of the return on investment issues. We are in the process of determining how we can best support the private sector in developing products and services that will ultimately serve this emerging market.

Emissions Trading and "Green Tags":

Green Tags is a notion where the environmental benefits of a particular generation source are marketed to consumers for a premium. In this case, farm based methane might offset conventional generation sources with their associated environmental impacts as well as reduce the amount of methane released in the atmosphere. Since naturally occurring methane is a significant greenhouse gas, using that gas could have a significant environmental benefit. Native Energy, Inc. is a company that markets green tags throughout the US. They have expressed interest in negotiating a contract to purchase these credits from a farm and sell these environmental benefits to consumers through these "Green Tags". The Vermont Methane Project is continuing to explore the risks and benefits of such a strategy from the producers perspective.

RESEARCH AND DEVELOPMENT

Foster Bros. Dairy Farm research and demonstration site:

Foster Bros. have a two chambered side-by-side digester that they have been using successfully for over 15 years. The Vermont Methane Project has isolated these into two separate digesters so that we can experiment with various materials and technologies and still maintain a control that we know works. Fosters began loading the digester in December of 2000 and has been producing biogas generated electricity since January 2001.

We were unable to conduct any experiments at the Foster Bros. facility during last quarter because the Fosters system experienced some down time. The generator on the system finally blew in April after 76,000 hours of nearly continuous run time. The Fosters had a replacement generator in place within two weeks, but it has taken some time to stabilize the entire system sufficiently to run any experiments. Over this next quarter under the direction of Stan Weeks and Dan Scruton, we hope to perform an experiment where we will increase the feed rate to one side of the digester until we are at a 10 day retention time and compare gas output. If we are successful, and double the volume of gas from the side we are feeding, it will mean the steam injection process developed by this project can reduce the initial cost of a digester and allow for a more automated system without the need to go to thermophilic.

Attached Growth Media Experiments: The project hired Steven Hoyt from Dubara Company to perform experiments on attached growth media in an attempt to speed the production of biogas and thereby reduce the retention time of manure in an anaerobic digester. The premise of this research is that reduced retention time of manure in a digester will allow engineers to design smaller digester and thereby reduce capital costs. Mr. Hoyt completed his research and his final report is available on-line at http://www.state.vt.us/psd/ee/Methane.htm

Methane Resource Assessment: The project hired Jeff Fehrs to research the volume of available organic wastes in Vermont that could be digested to produce methane. The goal of this research is to determine the energy potential of these various waste streams. These organic wastes include manure, biosolids and septage, industrial food waste and whey. Mr. Fehrs research is complete and his report has been reviewed by the advisory committee and published by the DPS. The final report is available on-line at http://www.state.vt.us/psd/ee/Methane.htm

Feasibility Studies / Inquiry follow-ups:

Jeff Forward and Dan Scruton originally contacted 17 farms that expressed interest in this project. We visited 13 of those and completed several pre-feasibility studies. Based on the high initial capital cost of anaerobic digestion, the reduced electrical demand of many dairy farms due to utility conservation programs and the low price paid for wholesale electricity, it was difficult to find a situation that had a positive cash flow strictly on electrical benefits. Our conclusion was that the typical farmer who would be interested in pursuing this technology was likely to be someone who has a relatively large herd, one who is sophisticated enough to want to take on a new technology and one who is interested in managing his nutrient loads.

With the passage of the net metering legislation, the cost effectiveness analysis for these initial feasibility studies could change significantly. We are considering going back to some of the more promising initial feasibility studies and re-running the financial analysis based on group net metering.

We also had a new inquiry over this past quarter. Jeff Forward visited a 600 cow farm in Orleans county to perform a preliminary pre-feasibility analysis. While the analysis is not complete, the farm seems like a good candidate for anaerobic digestion particularly considering this farm has many family members and ancillary farm buildings with accounts that could be grouped together for net metering. One complication on this farm is that these accounts happen to be on three different utility service territories. We will follow-up with this farm next quarter.

Also this quarter Dan Scruton has been continuing to work with specific farms:

- **Audet farm**. With the net metering legislation in place Audets will be able to negotiate with CVPS on a power contract and finalize their design. We should have final designs finished over the next month.
- **Gervais farm**. We are working with VPPSA on the option of a utility owned generator buying gas from the farm. The feasibility should be completed this summer.
- **Retreat Farm** in Brattleboro. We are providing engineering assistance on a bedding/odor control digester that should be built this fall.
- **Foster Bros**. farm. Met with Peter Wright from Cornell assist them in a series of case studies they are doing that will include Foster farm. Also have met with Fosters on options to prepare the system to start a reduced retention time study and options for changes to the experimental side of the digester.
- Followed up on other information requests as needed.

OUTREACH:

Tours:

One of the benefits of setting up our research project at Foster Brothers Farm in Middlebury is that it is an excellent demonstration site. The Fosters have nearly 20 years of experience with this technology and related systems and they are very excited about some of the experiments we are performing there. Tours of the Foster Bros. facility allow us to display some of our experimental technologies and it gives us a good opportunity to discuss with other individuals, groups and organizations possibilities for collaboration.

This past quarter, on May 3, Jeff Forward conducted a tour of the Foster Bros. farm for James Damato, a consulting engineer from southern Vermont who is working on a landfill gas to energy project. Attached is thank you letter from Mr. D'Amato explaining his interest.

Out-of-State Field Trip:

On May 14 through 16, Jeff Forward traveled to Pennsylvania to visit a manufacturer of sand separator equipment and the Mason Dixon farm, the oldest operating plug flow dairy farm digester in the country. Attached are trip notes with details about the trip and preliminary conclusions about the technologies.

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Attachments:

- S. 138 which includes a group net metering provisions as passed by VT House and Senate, June 21, 2002.
- June 3 letter from James Damato in regards to Foster Bros. Farm tour.
- Jeff Forward's Pennsylvania field trip notes
- June 17, 2002 Vermont Methane Project Advisory Committee Meeting Agenda